

Conservation Evaluation of Stoloniferous Pussytoes, *Antennaria flagellaris*, in Canada*

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In Canada, Stoloniferous Pussytoes, *Antennaria flagellaris*, is restricted to the Similkameen River valley south of Princeton, in south-western British Columbia. The three populations represent the northern limits of the species which ranges from south-western British Columbia, south in the western United States to Idaho, Wyoming, Nevada and California. In British Columbia, *Antennaria flagellaris* is associated with eroded, unstable, calcareous clay seepage slopes on open, southerly aspects. This habitat is infrequent in the Similkameen River area and the few existing plant populations could easily be extirpated through slight changes in drainage through drilling for coalbed methane gas, road-building, or housing development.

Key Words: Stoloniferous Pussytoes, *Antennaria flagellaris*, endangered, distribution, population size, British Columbia.

Stoloniferous Pussytoes, *Antennaria flagellaris* (A. Gray) A. Gray[†] is a member of a genus of approximately 35 species mainly of North America but also found in South America (Cronquist 1994). Fifteen species occur in British Columbia (Douglas 1998) and approximately 18 in Canada (Kartesz 1999). *Antennaria flagellaris* was first recorded in Canada by Douglas et al. (1998a).

Antennaria flagellaris is a stoloniferous, short-lived perennial from a fibrous root (Figure 1; Douglas 1998). The stolons are up to 10 cm long while the few central flowering stems are up to 3.5 cm tall. The numerous basal leaves and the few stem leaves are linear to linear-oblongate, silky woolly-hairy and 1-3 cm long. The flower heads are terminal with involucre of two types. The female involucre are 7-13 mm tall bracts that are tinged brown or reddish-brown, thinly woolly-hairy below. The male involucre are 4-7 mm tall translucent bracts that are brownish at the tips. The female flowers are 5-7 mm tall while the male flowers are 3-4.5 mm tall. The single-seeded achenes are elliptic, warty and 2-3 mm long with a 6-8 mm tall pappus that has white, hairlike bristles.

Distribution

Antennaria flagellaris ranges from southwestern British Columbia, south in the western United States to Idaho, Wyoming, Nevada and California (Cronquist

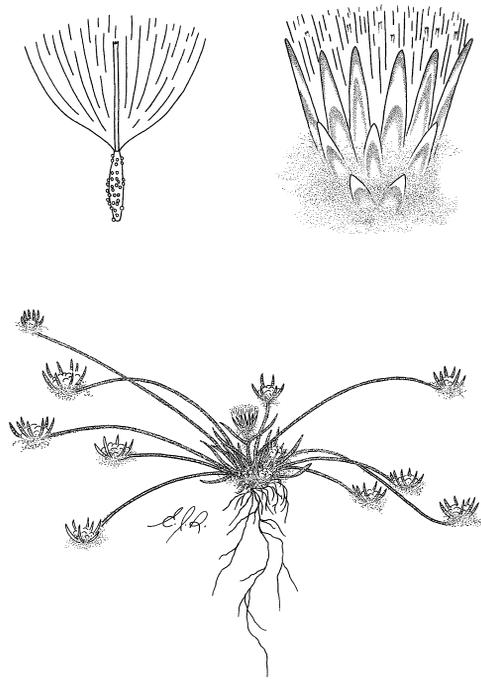


FIGURE 1. Illustration of *Antennaria flagellaris* (Line drawing by Elizabeth J. Steven in Douglas et al. 1998, 2002b).

* The field work for *Antennaria flagellaris* was funded by the British Columbia Conservation Data Centre. The results appear in the British Columbia Conservation Data Centre database and a rare plant manual (Douglas et al. 2002a). This information formed the basis for a Committee on the Status of Endangered Wildlife in Canada status report (Douglas and Penny 2004[†]) and the subsequent assessment of *Endangered* (COSEWIC 2004[†]). This paper includes more recent information that did not appear in the original status report.

[†] Taxonomy and nomenclature follow Douglas et al. (1998b, 1999, 2001).

TABLE 1. Locations and Population Sizes for *Antennaria flagellaris* near Princeton, British Columbia.

Collection site	Last Observation	Collector	Number of plants/area (m ²)
1. Stevenson Creek	1997	Lomer	50 ± 3 or 4
2. Whipsaw Creek, 2 km N of	1997	Lomer	Unknown
3. Stevenson Lake, 300 m NE of	2002	Douglas and Penny	1 400 000 ± 100 000/ 2100
4. Tracey Lake	2003	Lomer	4-500/84

1994). In Canada, *A. flagellaris* is known only from along a 3.2-km length of Highway #3 in the Similkameen River valley south of Princeton in southwestern British Columbia (Figure 2; Douglas 1998; Douglas et al. 1998a, 2002a, b).

Habitat

Antennaria flagellaris occurs in the southern interior of British Columbia along the Similkameen River valley in the lower montane zone in the Interior Douglas-fir biogeoclimatic zone (Hope et al. 1991). Climatic conditions in this region are continental, characterized by hot, dry summers, a fairly long growing season, and cool winters. A rainshadow effect prevails in this area due to the presence of the Coast-Cascade Mountains to the west. Within this zone, *A. flagellaris* occurs in calcareous, gravelly-clay soils or gravelly sands. The sites are characterized by a unique hydrology. The slopes, which are moderate (20-30%) with open southerly aspects, are eroded, unstable, and characterized by ephemeral seepage. These moist microsites are saturated by underground water in the winter and dry up in the summer. The slow down-slope movement that occurs as a result of the unusual hydrology is unique in the region and excludes many taxa which are not able to tolerate the conditions. As a result, the slope is disturbed and sparsely vegetated with *A. flagellaris* being the dominant component (Figure 3).

Vegetation in the vicinity of the *A. flagellaris* sites is characterized by Big Sagebrush (*Artemisia tridentata*) shrub/grassland with scattered Ponderosa Pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) [Nomenclature follows Douglas et al. 1998b, 1998c, 1999 and 2001]. The sites occur at the western edge of the distribution of open shrub/grassland at that elevation. Associates of *A. flagellaris* include Cushion Buckwheat (*Eriogonum ovalifolium* var. *nivale*), Parsnip-flowered Buckwheat (*E. heracleoides* var. *angustifolium*), Swale Desert-parsley (*Lomatium ambiguum*), Thread-leaved Sandwort (*Arenaria capillaris* ssp. *americana*), Slender Wheatgrass (*Elymus trachycaulus*), One-spike Oatgrass (*Danthonia unispicata*), Common Rabbit-brush (*Ericameria nauseosus* var. *speciosa*), and Cut-leaved Daisy (*Erigeron compositus* var. *glabratus*). No non-native species were found in association with *Antennaria flagellaris*.

Biology

Little information is available on the biology of *A. flagellaris* in British Columbia. Only basic reproductive facts have been compiled about the species.

Antennaria flagellaris is a short-lived perennial, dioecious (male and female structures on separate plants) and wind-pollinated. This species produces seeds sexually by outcrossing (Bayer 1996). The fruits consist of single-seeded achenes. The numerous hair-like bristles of the mature achene facilitate its dispersal by wind.

Antennaria flagellaris also reproduces vegetatively by producing stolons that terminate in plantlets. Initially, the mother plant provides the plantlet with nutrients via the stolon. The genetically identical plantlets eventually become independent plants as stolons are severed. This mode of reproduction results in very restricted dispersal, as stolons only grow up to 10 cm long (Douglas 1998).

Population Attributes

There are three recently surveyed populations of *Antennaria flagellaris* in the Similkameen River valley, south of Princeton, British Columbia (Table 1). These populations occur along a 3.2-km length of Highway #3 (Figure 2). The populations range from a couple of square metres to over 2100 m² in size and number from 50 to approximately 1 400 000 ± 100 000 plants.

Short- and long-term trends for these populations are unknown but can be expected to vary markedly due to differences in yearly plantlet survival, seed germination and seedling success. Growing conditions on the ephemerally moist, clay slopes may vary from year to year according to normal climatic fluctuations affecting site hydrology.

Provincial, National and Global Ranks

Globally, *Antennaria flagellaris* has a rank of G5? indicating that in most of its range the plant is apparently secure to demonstrably widespread, abundant, and secure. Since the species is restricted to British Columbia it has a national rank in Canada of N1. Provincially, *Antennaria flagellaris* has been ranked as S1 by the Conservation Data Centre and appears on the British Columbia Ministry of Environment Red list (Douglas et al. 2002a). This is the most critical rank that can be applied to species at the provincial level and indicates that the species is "critically imperiled because of extreme rarity (typically five or fewer occurrences or very few remaining individuals) or because of some factor(s) making it especially vulnerable to extirpation or extinction".

Threats and Protection

The major threat to populations of *Antennaria flagellaris* are through drilling for coalbed methane gas,

road construction, housing developments and off-road recreational vehicles. In 2002 three test holes, targeting coalbed methane gas deposits, were drilled in the Similkameen valley. If brought into production the drilling, access roads and pumping stations could cause major degradation in the area.

The southern interior of British Columbia has recently seen an increase in housing projects and the Princeton area is no exception. Any developments which even slightly change groundwater levels could be devastating to this taxon. Furthermore, suitable habitats for *A. flagellaris* are extremely restricted in Canada, only occurring in the Princeton area, thus opportunities for colonisation are extremely limited.

Although weeds are not a major threat to *A. flagellaris* populations, weed control activities do constitute a minor potential threat to populations. Under the *Weed Control Act*, an occupier must control noxious weeds growing or located on land and premises; thus marginally specific chemical weed control compounds, that kill broad-leaved plant species, would likely be fatal to *A. flagellaris*.

Recreational off-road vehicle use could also present a threat due to the nature of the steep, clay slopes where *A. flagellaris* occurs. When moist, this habitat would be highly susceptible to disturbance and at the same time, be at its most desirable to off-road users. Overuse of the habitat in this way could disturb the sites enough to radically alter the hydrological regime, and promote the establishment of non-native species.

Other potential threats result from activities that are permitted in the Agriculture Land Reserve. The private property where *A. flagellaris* occurs is on the Agricultural Land Reserve, where primary land use is agriculture. For instance, some types of fill/soil removal are allowable without application to the Agricultural Land Commission (Provincial Agricultural Land Commission 2003⁷). On these lands, development pressures may not appear to be an issue at this time. The Agricultural Land Reserve status may prevent subdivision development, but does allow other activities that could also potentially threaten the populations. In recent years many tracts of Agricultural Land Reserve land in southern British Columbia have been converted to housing developments, shopping malls, and golf courses, either by decisions of the Agricultural Land Commission or, very rarely, by an "order in council" by the sitting provincial legislature.

An additional threat to the population of *A. flagellaris* is its vulnerability to extirpation due to the extremely small occupied area and population size. Such small populations are at risk of inbreeding depression (Primack 1998). Due to lack of genetic variation, these small populations are vulnerable to demographic and environmental variation. Furthermore, suitable habitats for *C. flagellaris* in the southern interior of British Columbia are extremely limited and thus opportunities for colonisation are also limited.

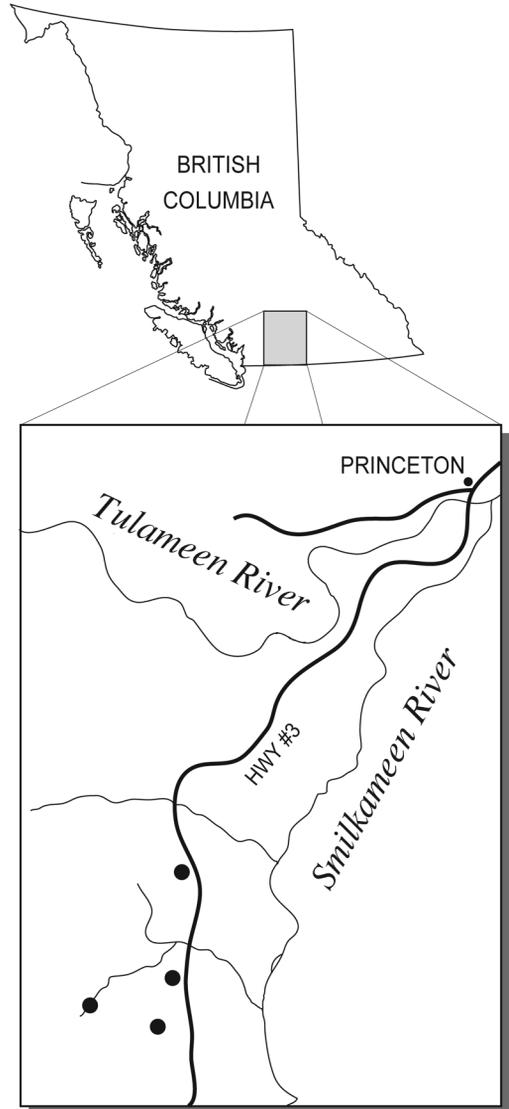


FIGURE 2. Distribution of *Antennaria flagellaris* in British Columbia.

Antennaria flagellaris is not formally protected in British Columbia, however, it could be in the future since this species is a potential candidate for listing under the provincial *Wildlife Amendment Act* (2004). As part of its commitment to the National Accord (*National Accord for the Protection of Species at Risk*), the province is required to take measures to protect this species. It is on Schedule 1 of the federal *Species At Risk Act* and a recovery strategy is expected to be completed by the summer of 2006.



FIGURE 3. Open habitat of *Antennaria flagellaris* in the Princeton area. *Antennaria flagellaris* is abundant in the open areas between clumps of *Eriogonum heracleoides* var. *angustifolium* and *Ericameria nauseosus* var. *speciosa*.

Evaluation

The British Columbia Conservation Data Centre considers *A. flagellaris* to be Endangered in British Columbia (Douglas et al. 2002a). The Committee on the Status of Endangered Wildlife in Canada has also assigned this species to the Endangered category (COSEWIC 2004*). The three populations are small and vulnerable to a number of threats. With limited knowledge of the plants, biological and ecological requirements, this species is vulnerable to extirpation in British Columbia. Without research on growth requirements and further demographic information, the stability of the present populations will remain unknown. The limited number of plants also reduces the potential for genetic variation which may be necessary to respond to environmental changes in the future.

Acknowledgments

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